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Polymerizable solid aliphatic polyurethanes containing olefinically unsaturated double bonds and based on linear diisocyanates and use thereof

5 **Claims**

- Sub A1
1. A polymerizable solid aliphatic polyurethane containing olefinically unsaturated double bonds, having a very narrow melting range within the temperature range from 40 to 200°C, which is preparable from
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- A) at least one linear aliphatic diisocyanate,
- 15 B) at least one aliphatic compound containing at least two isocyanate-reactive functional groups and/or water, and
- C) at least one olefinically unsaturated compound containing an isocyanate-reactive functional group.
- 20
2. The aliphatic polyurethane of claim 1, characterized in that it has a melting range from 0.5 to 10°C, in particular from 1 to 6°C.
- 25
3. The aliphatic polyurethane of claim 1 or 2, characterized in that it has a sharp melting point.
- 30 4. The aliphatic polyurethane of one of claims 1 to 3, characterized in that it has a very narrow melting range or a sharp melting point in the temperature range from 60 to 185°C.
- 35 5. The aliphatic polyurethane of one of claims 1 to 4, characterized in that it contains terminal and/or

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cont: lateral, especially terminal, olefinically unsaturated
double bonds.

6. The aliphatic polyurethane of claim 5,
5 characterized in that the olefinically unsaturated
double bonds are present in (meth)acrylate, vinyl
ether, vinyl ester, allyl, allyl ether and/or allyl
ester groups, preferably methacrylate and/or acrylate
groups, especially acrylate groups.

10 7. The aliphatic polyurethane of one of claims 1 to
6, characterized in that the linear aliphatic
diisocyanate A) represents a monomeric diisocyanate
and/or an oligomeric or polymeric diisocyanate
15 preparable from

A) at least one linear aliphatic diisocyanate and
B) at least one aliphatic compound containing at
20 least two isocyanate-reactive functional groups.

8. The aliphatic polyurethane of one of claims 1 to
7, characterized in that the isocyanate-reactive
functional groups are amino groups, thiol groups and/or
25 hydroxyl groups, preferably amino groups and/or
hydroxyl groups, particularly hydroxyl groups.

9. The aliphatic polyurethane of claim 8,
characterized in that the aliphatic compound B) is
30 linear.

10. The aliphatic polyurethane of claim 9, that the
linear aliphatic compound B) is a diamine, triamine,
amino alcohol containing at least one amino group and
35 at least one hydroxyl group, diol, triol, tetrol and/or
sugar alcohol.

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cont.
- 11 The aliphatic polyurethane of claim 10, characterized in that a low molecular weight diol, triol or a tetrol or a sugar alcohol having a molecular weight of from 62 to 200 daltons and/or a linear aliphatic oligomeric and/or polymeric polyesterdiol and/or polyetherdiol is used as linear aliphatic compound B).
12. The aliphatic polyurethane of one of claims 1 to 11, characterized in that
- (1) at least one diisocyanate A) is reacted with at least one compound C) in a molar ratio A) : C) of 1 : 1 to give an adduct A/C) containing one isocyanate group and one olefinically unsaturated group, and then
- (2) the adduct A/C) is reacted with at least one compound B) in a molar ratio A/C) : B) of x : 1, wherein x is the number of the isocyanate-reactive groups in the at least one compound B), to give the aliphatic polyurethane.
13. The aliphatic polyurethane of one of claims 1 to 11, characterized in that
- (1) at least one diisocyanate A) is reacted with at least one compound B) in a molar ratio A) : B) of x : 1, wherein x is the number of the isocyanate-reactive groups in the at least one compound B) to give the adduct A/B) containing x isocyanate groups, and then
- (2) the adduct A/B) is reacted with at least one compound C) in a molar ratio C) : A/B) of x : 1, wherein x is the number of the isocyanate groups

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cont.

in the adduct A/B) to give the aliphatic polyurethane.

14. The aliphatic polyurethane of claim 12 or 13,
5 characterized in that x is a number, in particular a whole number, from 2 to 6.

15. The aliphatic polyurethane of one of claims 1 to 14, characterized in that its soft phase has a glass
10 transition temperature $T_g < 25^\circ\text{C}$.

16. Use of the aliphatic polyurethane according to one of claims 1 to 15 as powder coating material or for
15 preparing powder coating materials.

17. A powder coating material curable thermally and/or with actinic radiation which comprises or consists of at least one aliphatic polyurethane according to one of
20 claims 1 to 15.

18. The powder coating material of claim 17, characterized in that it further comprises oligomers and/or polymers which are curable thermally and/or with actinic radiation and have a glass transition
25 temperature T_g of more than 40°C .

19. The powder coating material of claim 17 or 18, characterized in that it further comprises customary coatings additives.
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20. The powder coating material of one of claims 17 to 19, characterized in that it is in the form of a powder slurry coating material.

35 21. A coating producible from a powder coating material according to one of claims 17 to 20.

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cont.* → 22. Primed and unprimed substrates, especially bodies of automobiles and commercial vehicles, industrial components, including plastics parts, packaging, coils, and electrical components, or furniture, comprising at least one coating according to claim 20.
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Add A2